

Vertical Integration of Research and Education in the Mathematical Sciences (VIGRE)

Program Solicitation

NSF 02-120

Replaces Document NSF 01-104



National Science Foundation
Division of Mathematical Sciences

Full Proposal Deadline(s) (due by 5 p.m proposer's local time):

July 29, 2002
and the last Monday of July in later years.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Vertical Integration of Research and Education in the Mathematical Sciences (VIGRE)

Synopsis of Program:

The long-range goal of the VIGRE program is to increase the number of well-prepared U.S. citizens, nationals, and permanent residents who pursue careers in the mathematical sciences. A successful VIGRE project must:

1. integrate research with educational activities;
2. enhance interaction among undergraduates, graduate students, postdoctoral associates, and faculty members;
3. broaden the educational experiences of its students and postdoctoral associates to prepare them for a wide range of career opportunities; and
4. motivate more students to pursue an education in the mathematical sciences. With these goals in mind, each VIGRE proposal must present a coherent plan for the integration of:
 - a graduate traineeship program,
 - an undergraduate research experience program, and
 - a postdoctoral program.

Cognizant Program Officer(s):

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Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):

- 47.049 --- Mathematical and Physical Sciences

Eligibility Information

- **Organization Limit:** Proposals may be submitted by academic institutions in the U.S. and its territories on behalf of Ph.D. granting departments that have programs in the mathematical sciences at both the graduate and undergraduate levels.
- **PI Eligibility Limit:** None Specified.
- **Limit on Number of Proposals:** At most one proposal may be submitted by any given department during each competition.

Award Information

- **Anticipated Type of Award:** Other - Continuing Grant (initial funding for three years, with a possible extension for another two years contingent upon the outcome of a third-year review and performance assessment by NSF), and subject to availability of funds.
- **Estimated Number of Awards:** 10 - 3- 10 are expected to result from this competition, contingent upon availability of funds.
- **Anticipated Funding Amount:** \$12,000,000 Pending availability of funds, it is estimated that about \$12.0 million will be available for this program.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Full Proposal Preparation Instructions:** The program announcement/solicitation contains deviations from the standard Grant Proposal Guide (GPG) proposal preparation guidelines. Please see the full program announcement/solicitation for further information.

B. Budgetary Information

- **Cost Sharing Requirements:** Cost Sharing is Specialized. Please see the full funding opportunity document for further information.
- **Indirect Cost (F&A) Limitations:** Indirect costs (F&A) are limited to 8% of modified total direct costs; no indirect costs are allowed on funds awarded for tuition and fees.
- **Other Budgetary Limitations:** Not Applicable.

C. Due Dates

- **Full Proposal Deadline Date(s)** (due by 5 p.m proposer's local time):
July 29, 2002
and the last Monday of July in later years.

Proposal Review Information

- **Merit Review Criteria:** National Science Board approved criteria. Additional merit review considerations apply. Please see the full funding opportunity document for further information.

Award Administration Information

- **Award Conditions:** Additional award conditions apply. Please see the full funding opportunity document for further information.
- **Reporting Requirements:** Additional reporting requirements apply. Please see the full funding opportunity document for further information.

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I. INTRODUCTION

The Division of Mathematical Sciences (DMS) announces a continuation of the Vertical Integration of Research and Education in the Mathematical Sciences (VIGRE) competition for institutions with Ph.D.-granting departments in the mathematical sciences. The long-range goal of the VIGRE program is to increase the number of well-prepared U.S. citizens, nationals, and permanent residents who pursue careers in the mathematical sciences. VIGRE is designed to stimulate innovative educational projects that:

1. Integrate research with educational activities;
2. enhance interaction among undergraduates, graduate students, postdoctoral associates, and faculty members;
3. broaden the educational experiences of its students and postdoctoral associates to prepare them for a wide range of career opportunities; and
4. motivate more students to pursue an education in the mathematical sciences. In this context, VIGRE provides funds to support:
 - postdoctoral associate positions with enhanced opportunities for research;
 - graduate research traineeships; and
 - research experiences for undergraduates.

Thus the focus of this program is the effectiveness of the educational experience of students and postdoctoral associates in preparing them to become successful researchers, communicators, and mentors.

II. PROGRAM DESCRIPTION

A prerequisite to a VIGRE proposal is a thorough review of existing graduate and undergraduate curricula, with attention to how well the curricula prepare students for the diverse career opportunities now available to mathematical scientists. Proposed changes to the curricula should be discussed in a VIGRE proposal.

Every VIGRE proposal must have at its core a coherent plan for the integration of:

- a graduate traineeship program
- an undergraduate research experience program
- a postdoctoral program.
- Proposals should describe the proposed mechanisms for interaction among undergraduates, graduate trainees, postdoctoral associates, and faculty, and how these mechanisms will achieve the VIGRE goals.

Descriptions of Primary Components.

Graduate Traineeships. The graduate trainees must be a pivotal component of the integration. They are expected to be involved in research activities that include undergraduates, other graduate students, postdoctoral associates, and faculty. Mentoring is expected to be a critical component of the graduate trainees' experience, preparing them to become successful researchers, communicators, and mentors. The traineeships are intended to be a vehicle for broadening graduate education and improving communication skills. The VIGRE activity is meant to allow significant time for research, course work to broaden the trainee's knowledge, and activities such as internship experiences in industry, business, government laboratories, or other science/engineering departments. It is not adequate merely to create a source of summer support for students who are required to teach throughout the academic year. An individual student can receive up to 33 months of non-teaching support from a VIGRE award. In addition, graduate trainees are expected to have a significant teaching experience. This should include a minimum of one year of supervised teaching, with at least one term in which the student has substantial responsibility for a class. The institution is expected to bear the cost of a VIGRE trainee's required teaching. The development of skills for communicating with both expert and non-expert audiences is viewed as another important aspect of the traineeship. In particular, traineeship activities should be designed to help students develop proficiency in the presentation of mathematical research in both written and oral formats and the ability to place that research in context. Departments are expected to utilize the traineeships to improve the quality of the education their graduate students receive. The traineeships are not meant to promote expansion of graduate programs by enabling departments to hire additional teaching assistants, and should not replace existing institutional funding of research fellowships or scholarships. **Undergraduate Research Experience.** In this program solicitation, the term "research experience" includes all activities that introduce undergraduates to the thrill of discovery and generate within them excitement for the mathematical sciences. Examples of research experiences include: faculty directed projects, whether involving one or many undergraduates, either during part of the academic year or the summer; internships in industry, business, or government laboratories; and participation in interdisciplinary research teams. Such experiences are intended to involve students in the

creative aspects of mathematics in a non-classroom setting. They are also expected to enhance the development of students' communication skills, with particular emphasis on the presentation of mathematical concepts in both written and oral contexts. In all cases, it is expected that these undergraduates receive mentoring to stimulate their further interest in the mathematical sciences.

Postdoctoral Associates. Effective VIGRE activities better prepare postdoctoral associates for their future careers, whether in academia, industry or government. It is expected that at the end of the postdoctoral experience each associate will have a well-defined independent research program, well-developed communication skills, a broad perspective of his or her field, and the ability to mentor. The size of the request for postdoctoral support should be consistent with the capability of the department to provide associates with appropriate resources and training for their professional development. It is the intention that a typical VIGRE postdoctoral associate be supported for 31 months, beginning within 18 months of completion of the associate's Ph.D. Exceptions to the 18 month restriction require approval from the VIGRE Management Team. Postdoctoral programs can include, for instance, interdisciplinary research experiences in other academic departments and programs, industry, business, or government laboratories, or they can allow a postdoctoral associate to spend a year at a research institute whose program is suitably aligned with the individual's research interests. Each VIGRE associate is expected to submit a research proposal to a funding agency at some point during the course of the postdoctoral appointment. Postdoctoral associates are expected to teach (on average) one course per term while in residence at the sponsoring university. Over the duration of the postdoctoral appointment, this teaching should encompass a diverse set of instructional experiences. It is expected that all postdoctoral associates receive mentoring to ensure they become successful researchers, communicators, and mentors.

Other required Components. Other required components of a VIGRE proposal include the outcome of curriculum review, recruitment and retention plans, an organization and management plan, a performance assessment plan, and a plan to disseminate VIGRE activities, experiences and insights. Also, each proposal must include a plan for continued pursuit of VIGRE goals after VIGRE funding terminates, whether this is after three years or after five years.

Optional Activities. Proposals may include one or both of the following optional activities:

- Curriculum/Instructional Materials Development. Projects may include development of new or implementation of existing instructional materials, or significant curriculum development projects.

It should be stressed that a department is expected to provide its own resources to cover costs for normal changes in its curriculum and upgrades in the standard infra-structural elements required for its instructional mission. The optional activities envisioned for a VIGRE proposal should involve significant changes, exhibit substantial originality, be highly portable, and be made nationally available. Activities devoted to the preparation of future K-12 teachers, such as curriculum development and research experiences, may also be appropriate. K-12 teacher preparation projects and instructional materials development projects concerned with undergraduate education may be jointly considered and funded by the Division of Undergraduate Education (DUE). For further information on the type of projects funded by DUE, see Division of Undergraduate Education: Course, Curriculum, and Laboratory Improvement (CCLI) ([NSF 02-043](#)).

- Outreach. Activities that form and strengthen linkages to K-12 and informal education are considered desirable objectives of this program. These might include teacher enhancement, informal education in a variety of forms, and involvement in state, urban, and local systemic initiatives. Both the teacher enhancement and informal education components may be jointly considered and funded by the Division of Elementary, Secondary, and Informal Education (ESIE). For further information on the type of projects funded by ESIE, see Elementary, Secondary, and Informal Education: Program Solicitation and Guidelines ([NSF 01-60](#)).

These optional activities should be integrated with the other VIGRE activities. They should not constitute the primary thrust of the proposal, nor should the major effort involved in carrying out these projects fall to either students or postdoctoral associates.

III. ELIGIBILITY INFORMATION

Proposals may be submitted by academic institutions in the U.S. and its territories on behalf of Ph.D. granting departments that have programs in the mathematical sciences at both the graduate and undergraduate levels.

IV. AWARD INFORMATION

Each proposal should describe a five-year program. Awards will initially fund the first three years of the project. Funding for the remaining two years is not guaranteed, and is contingent upon a satisfactory outcome of a comprehensive third-year assessment by NSF. Funding is always subject to availability of funds. VIGRE funds will provide awards in amounts up to \$1,000,000 per year (including direct and indirect costs) to support the main activities for a duration not to exceed five years. However, it is expected that the

average award size will be under \$500,000 per year. A modest amount of additional funding may be available to support the two optional activities. (Funding for these activities may also be requested as a supplement at a later date.) In determining the number and size of awards, NSF considers the advice of reviewers, and availability of funds. The Division of Mathematical Sciences anticipates making between 3 and 10 awards each year in this competition. It is projected that awards resulting from the competition will be announced in February each year.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal Instructions:

Proposals submitted in response to this program announcement/solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF *Grant Proposal Guide* (GPG). The complete text of the GPG is available electronically on the NSF Website at: <http://www.nsf.gov/cgi-bin/getpub?gpg>. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (301) 947-2722 or by e-mail from pubs@nsf.gov.

All VIGRE proposals must be submitted via FastLane. The Cover Sheet should identify the Division of Mathematical Sciences and the Infrastructure Program as the organizational unit to receive the proposal. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

Each proposal must contain the following elements. Proposals that do not strictly adhere to the specified page limitations will be declared ineligible for consideration.

1. *NSF Cover Sheet* (NSF Form 1207).
2. *Project Summary*. Provide a brief (200 words or less) description of the program, including the research themes, educational features, and objectives.
3. *Table of Contents*. A Table of Contents will be automatically generated by FastLane.
4. *VIGRE Project Description*. The proposed project should have a five-year duration. Particular attention must be paid to the following items in preparing the description:
 - Introduction. The vision, scope, objectives, and anticipated impact of the program, at the local institution and beyond, should be discussed. This section must not exceed 2 pages.
 - Outcome of curriculum review. Planned or implemented changes based on the curriculum review should be presented. This section must not exceed 2 pages.
 - Proposed VIGRE project. This section should provide a discussion of the programs envisioned for graduate trainees, undergraduate research experiences, and postdoctoral associates. Proposals should describe the proposed mechanisms for interaction among undergraduates, graduate trainees, postdoctoral associates, and faculty, and how these mechanisms will achieve the VIGRE goals. Proposals should also describe how education will be integrated with research, and ways in which the project will broaden the experience of the students and postdoctoral associates involved and enhance their career opportunities. In addition to research activities and the broadening of course work, proposals should also describe activities such as industrial internships or arrangements with government laboratories, businesses, or other academic departments, and how these activities contribute to meeting the VIGRE goals. Teaching requirements for the graduate trainees and the postdoctoral associates must be described. A discussion of adequate mentoring for each of these activities should be included. The discussion should also address how the VIGRE program is expected to affect time-to-degree for graduate trainees. The proposed means of improving communication skills at all levels should be discussed. Finally, there should also be a discussion of how the VIGRE

activities are expected to affect students and postdoctoral associates not supported on VIGRE funds. This section must not exceed 15 pages.

- **Optional activities.** If the project is to include (a) curriculum/instructional materials development and/or (b) outreach, these should be described, together with an explanation of how these activities are integrated with the other VIGRE activities. Development of any new materials and plans for their dissemination should be discussed. If outreach to K-12 or informal education is part of the project, then the goals, the audience, and the proposed activities should be described. Any plans for the preparation of future teachers or the enhancement of current teachers should also be discussed here. Supplemental funding may be available to support efforts in this direction. The description of each optional activity proposed must not exceed 5 pages.
- **Recruitment and Retention.** Plans for the recruitment and retention of students and postdoctoral associates should be described. Plans to motivate more students to pursue an education in the mathematical sciences should also be discussed. Specific provisions for the recruitment of U.S. citizens, nationals, and permanent residents as well as women and members of other groups underrepresented in the mathematical sciences must be included. This section must not exceed 2 pages.
- **Organization and Management Plan.** The plans, procedures, and personnel for the development and monitoring of all aspects of the project should be described. In particular, plans to ensure appropriate mentoring of students and postdoctoral associates should be discussed. Evidence of the faculty commitment necessary for the implementation of the proposed program should be provided. If the project involves industrial internships or arrangements with government laboratories, businesses, or other departments, then the proposal should discuss existing arrangements, any plans for expanding these arrangements, and the personnel involved in managing these linkages. If the proposal describes a joint project between two or more departments at the same institution, organization and management plans for the necessary interactions between the departments should be described. This section must not exceed 3 pages.
- **Performance Assessment.** Each proposal should describe a plan to assess the progress towards the achievement of the VIGRE goals. This plan should describe the quantitative and qualitative information that will be used to monitor the VIGRE activities and determine necessary mid-course corrections. The performance assessment can also help prepare VIGRE sites for the comprehensive review that will be conducted by NSF. This section must not exceed 5 pages.
- **Dissemination.** The VIGRE program is intended to have a positive impact at the national level on the mathematical sciences community. Broad dissemination of VIGRE site activities, experiences, and insights is critical to achieve this. Each proposal must include a plan for this dissemination. It is important to disseminate both successful activities as well as unsuccessful activities and mid-course corrections. This section must not exceed 2 pages.
- **Post-VIGRE plan.** The VIGRE program is intended to help stimulate and implement permanent positive changes in education and training within the mathematical sciences in the U.S. Thus it is critical that a VIGRE site adequately plan how to continue the pursuit of VIGRE goals when funding terminates. This section must not exceed 2 pages.

5. **Budget.** A budget for each year of support requested should be provided. Indirect costs on awards are limited to 8% of modified total direct costs. Moreover, no indirect costs will be allowed on funds awarded for tuition and fees. **Funding Categories.** *All VIGRE stipend recipients must be citizens, nationals, or permanent residents of the U.S.* The major portion of awarded funds must be used for training and educational activities for graduate students, undergraduate students, and postdoctoral associates. In particular, VIGRE awards will provide funds for senior faculty salary only under the circumstances described in the last item below.

- **Graduate Students:** VIGRE funds will provide \$18,000 per student for eleven months each year, with an allowance for tuition and fees of up to \$10,500 per year per student. Stipends may be supplemented during non-teaching periods with support from other sources. The institution must bear the cost of the one-year teaching requirement for VIGRE graduate trainees.
- **Undergraduate Students:** The stipends for summer projects are expected to be at least \$1,000 per month, with academic year stipends comparable on a pro rata basis.

- **Postdoctoral Associates:** It is expected that a typical VIGRE postdoctoral associate has a 3-year appointment. A VIGRE postdoctoral appointment must not exceed 3 years. The full-time rate for the university appointment should be at least \$36,000 for the academic year. At most \$18,000 per academic year of VIGRE funds can be used toward the stipend of a full-time VIGRE postdoctoral associate. Postdoctoral associates who receive any support from VIGRE funds must be full-time postdoctoral associates and must be supported by VIGRE funds for at least half the academic year. The VIGRE funds used toward the academic year stipend of a part-time VIGRE postdoctoral associate should be prorated accordingly. Each full-time VIGRE postdoctoral associate is expected to teach, on average, one course per term. The teaching load of a part-time VIGRE postdoctoral associate should be prorated under the assumption that a full-time university postdoctoral associate appointment requires at most seven classroom contact hours per week. In addition, the grant will provide summer support for two summers at the rate of \$6,500 per summer. The associate is expected to apply to an appropriate external funding agency for support for the third summer. Funding for the postdoctoral appointments should include a total of \$7,500 for the three years to cover travel, equipment, and supplies.
- **Optional Activities:** Requests for funding to support either or both of the two optional activities will be considered, either as part of the original proposal or as a supplementary request submitted at a later time within the duration of the award.
- **Other:** Requests for funds required to gain access to the laboratories of other disciplines or to provide release time during the first two award years for faculty who organize cooperative opportunities with other disciplines, industry, or business will be considered. Requests for funds to enable graduate or undergraduate students to attend professional meetings or conferences will also be considered, as will requests for funds to recruit graduate students and postdoctoral associates. Individuals in these requests must be eligible for VIGRE support.

6. *Budget Justification.* A brief justification for funds in each budget category mentioned above should be provided. This section must not exceed 4 pages.
7. *Biographical Sketches.* A curriculum vitae or short biographical sketch should be provided for each of the key personnel. This should include a list of no more than 10 publications, the names of PhD students and postdoctoral fellows supervised, and the names of individuals with whom the faculty member has collaborated within the last 48 months. The information must not exceed 2 pages for each individual. This information should be supplied **ONLY FOR KEY PARTICIPANTS IN THE PROJECT**, not for every member of the department.
8. *Current and Pending Support.* This information should only be provided for the PI and each Co-PI.
9. *Supplementary Documents:* Each proposal should include two appendices.

Appendix (1) should consist of data indicating: (a) the number of baccalaureate degrees in the mathematical sciences awarded by the relevant department(s) in each of the past five years; (b) the number of full-time Ph.D. students for each of the past five years; (c) a list of Ph.D. recipients during the past five years, along with each individual's citizenship status, baccalaureate institution, time-to-degree, post-Ph.D. placement, and thesis advisor; (d) the names of postdoctoral associates (e.g., holders of named instructorships, 2- or 3-year terminal assistant professors) during the past five years, their Ph.D. institutions, postdoctoral mentors, and post-appointment placements; (e) the dollar amount of non-teaching (i.e., research assistantship) support of graduate students supplied by the university for each of the past five years and the anticipated changes in university support of this kind in the event of an award; (f) the dollar amount of funding by federal agencies for REUs, for graduate students and for postdoctoral associates in each of the past five years; (g) the anticipated size of the graduate program should this award be received. This information will provide baseline data to be used in subsequent performance assessments. **Appendix (2)** should consist of letters of commitments by the institution and other sources in support of the project. If industrial internships are planned, letters indicating the willingness of the industrial organization and of individual industrial mentors (if known) to participate should also be included. These documents should be scanned and uploaded into the FastLane supplementary documentation section.

Proposers are reminded to identify the program announcement/solicitation number (02-120) in the program announcement/solicitation block on the proposal Cover Sheet. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

B. Budgetary Information

Cost Sharing:

- The host institution is responsible for funding 50% of the VIGRE postdoctoral appointments during the academic year based on an academic year FTE rate of \$36,000.
- The institution must bear the cost of the one-year teaching requirement for VIGRE graduate trainees.
- Funds for graduate student tuition and fees are limited to \$10,500 per student per year.

The proposed cost sharing must be shown on Line M on the proposal budget. Documentation of the availability of cost sharing must be included in the proposal. Only items which would be allowable under the applicable cost principles, if charged to the project, may be included as the awardee's contribution to cost sharing. Contributions may be made from any non-Federal source, including non-Federal grants or contracts, and may be cash or in-kind (see OMB Circular A-110, Section 23). It should be noted that contributions counted as cost-sharing toward projects of another Federal agency may not be counted towards meeting the specific cost-sharing requirements of the NSF award. All cost-sharing amounts are subject to audit. Failure to provide the level of cost-sharing reflected in the approved award budget may result in termination of the NSF award, disallowance of award costs and/or refund of award funds to NSF.

Indirect Cost (F&A) Limitations:

Indirect costs (F&A) are limited to 8% of modified total direct costs; no indirect costs are allowed on funds awarded for tuition and fees.

C. Due Dates

Proposals must be submitted by the following date(s):

Full Proposal Deadline(s) (due by 5 p.m proposer's local time):

July 29, 2002
and the last Monday of July in later years.

D. FastLane Requirements

Proposers are required to prepare and submit all proposals for this announcement/solicitation through the FastLane system. Detailed instructions for proposal preparation and submission via FastLane are available at: <http://www.fastlane.nsf.gov/a1/newstan.htm>. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail fastlane@nsf.gov. The FastLane Help Desk answers general technical questions related to the use of the FastLane system. Specific questions related to this program announcement/solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this announcement/solicitation.

Submission of Electronically Signed Cover Sheets. The Authorized Organizational Representative (AOR) must electronically sign the proposal Cover Sheet to submit the required proposal certifications (see Chapter II, Section C of the [Grant Proposal Guide](#) for a listing of the certifications). The AOR must provide the required electronic certifications within five working days following the electronic submission of the proposal. Proposers are no longer required to provide a paper copy of the signed Proposal Cover Sheet to NSF. Further instructions regarding this process are available on the FastLane Website at: <http://www.fastlane.nsf.gov>

VI. PROPOSAL REVIEW INFORMATION

A. NSF Proposal Review Process

Reviews of proposals submitted to NSF are solicited from peers with expertise in the substantive area of the proposed research or education project. These reviewers are selected by Program Officers charged with the oversight of the review process. NSF invites the proposer to suggest, at the time of submission, the names of appropriate or inappropriate reviewers. Care is taken to ensure that reviewers have no conflicts with the proposer. Special efforts are made to recruit reviewers from non-academic institutions, minority-serving institutions, or adjacent disciplines to that principally addressed in the proposal.

The National Science Board approved revised criteria for evaluating proposals at its meeting on March 28, 1997 ([NSB 97-72](#)). All NSF proposals are evaluated through use of the two merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

On July 8, 2002, the NSF Director issued Important Notice 127, Implementation of new Grant Proposal Guide Requirements Related to the Broader Impacts Criterion. This Important Notice reinforces the importance of addressing both criteria in the preparation and review of all proposals submitted to NSF. NSF continues to strengthen its internal processes to ensure that both of the merit review criteria are addressed when making funding decisions.

In an effort to increase compliance with these requirements, the January 2002 issuance of the GPG incorporated revised proposal preparation guidelines relating to the development of the Project Summary and Project Description. Chapter II of the GPG specifies that Principal Investigators (PIs) must address both merit review criteria in separate statements within the one-page Project Summary. This chapter also reiterates that broader impacts resulting from the proposed project must be addressed in the Project Description and described as an integral part of the narrative.

Effective October 1, 2002, NSF will return without review proposals that do not separately address both merit review criteria within the Project Summary. It is believed that these changes to NSF proposal preparation and processing guidelines will more clearly articulate the importance of broader impacts to NSF-funded projects.

The two National Science Board approved merit review criteria are listed below (see the [Grant Proposal Guide](#) Chapter III.A for further information). The criteria include considerations that help define them. These considerations are suggestions and not all will apply to any given proposal. While proposers must address both merit review criteria, reviewers will be asked to address only those considerations that are relevant to the proposal being considered and for which he/she is qualified to make judgements.

What is the intellectual merit of the proposed activity?

How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of the prior work.) To what extent does the proposed activity suggest and explore creative and original concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

What are the broader impacts of the proposed activity?

How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

NSF staff will give careful consideration to the following in making funding decisions:

Integration of Research and Education

One of the principal strategies in support of NSF's goals is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions provide abundant opportunities where individuals may concurrently assume responsibilities as researchers, educators, and students and where all can engage in joint efforts that infuse education with the excitement of discovery and enrich research through the diversity of learning perspectives.

Integrating Diversity into NSF Programs, Projects, and Activities

Broadening opportunities and enabling the participation of all citizens -- women and men, underrepresented minorities, and persons with disabilities -- is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

Additional Review Criteria In addition to the above review criteria, reviewers will be asked to apply a number of program specific criteria when reviewing VIGRE proposals. These criteria consist of the likely effectiveness of each of the items listed below:

- Mechanisms to stimulate interaction among students, postdoctoral associates, and faculty.
- Integration of research with education.
- Mechanisms to broaden graduate education.
- Improvement of communication skills of graduate trainees and postdoctoral associates.
- Mentoring plans.
- Recruitment plans to increase participation in the mathematical sciences of U.S. citizens, nationals, and permanent residents as well as women and members of other underrepresented groups.
- Plans to motivate more students to pursue an education in the mathematical sciences.
- Plans to disseminate VIGRE project activities and experiences.
- Plans to continue pursuit of VIGRE goals after VIGRE funding terminates.

B. Review Protocol and Associated Customer Service Standard

All proposals are carefully reviewed by at least three other persons outside NSF who are experts in the particular field represented by the proposal. Proposals submitted in response to this solicitation will initially be reviewed by a panel. NSF will conduct site visits to the submitting institutions of proposals recommended for further consideration. Final recommendations for these proposals will be formulated subsequent to the site visits. .

Reviewers will be asked to formulate a recommendation to either support or decline each proposal. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

A summary rating and accompanying narrative will be completed and submitted by each reviewer. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers, are sent to the Principal Investigator/Project Director by the Program Director. In addition, the proposer will receive an explanation of the decision to award or decline funding.

NSF is striving to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. The time interval begins on the date of receipt. The interval ends when the Division Director accepts the Program Officer's recommendation.

In all cases, after programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements for review of business, financial, and policy implications and the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at their own risk.

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

Notification of the award is made to *the submitting organization* by a Grants Officer in the Division of Grants and Agreements. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program Division administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See section VI.A. for additional information on the review process.)

B. Award Conditions

An NSF award consists of: (1) the award letter, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award letter; (4) the applicable award conditions, such as Grant General Conditions (NSF-GC-1); * or Federal Demonstration Partnership (FDP) Terms and Conditions * and (5) any announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative agreement awards also are administered in accordance with NSF Cooperative Agreement Terms and Conditions (CA-1). Electronic mail notification is the preferred way to transmit NSF awards to organizations that have electronic mail capabilities and have requested such notification from the Division of Grants and Agreements.

*These documents may be accessed electronically on NSF's Website at http://www.nsf.gov/home/grants/grants_gac.htm. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (301) 947-2722 or by e-mail from pubs@nsf.gov.

More comprehensive information on NSF Award Conditions is contained in the NSF *Grant Policy Manual* (GPM) Chapter II, available electronically on the NSF Website at <http://www.nsf.gov/cgi-bin/getpub?gpm>. The GPM is also for sale through the Superintendent of Documents, Government Printing Office (GPO), Washington, DC 20402. The telephone number at GPO for subscription information is (202) 512-1800. The GPM may be ordered through the GPO Website at <http://www.gpo.gov>.

Special Award Conditions:

While each proposal should describe a five-year program, awards will be made funding only the first three years of the project. Additional funding for the remaining two years will be contingent upon the satisfactory outcome of a comprehensive third-year assessment by NSF. Funding is always subject to availability of funds.

In addition to the prior approval requirements set forth in GC-1 or FDP-III, as applicable, the cognizant NSF program official must be notified prior to any reallocation of funds in excess of \$25,000.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the PI must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period.

Additional reporting requirements based on the additional review criteria will be included in the award letter.

Within 90 days after the expiration of an award, the PI also is required to submit a final project report. Failure to provide final technical reports delays NSF review and processing of pending proposals for that PI. PIs should examine the formats of the required reports in advance to assure availability of required data.

PIs are required to use NSF's electronic project reporting system, available through FastLane, for preparation and submission of annual and final project reports. This system permits electronic submission and updating of project reports, including information on project participants (individual and organizational), activities and findings, publications, and other specific products and contributions. PIs will not be required to re-enter information previously provided, either with a proposal or in earlier updates using the electronic system.

VIII. CONTACTS FOR ADDITIONAL INFORMATION

General inquiries regarding this program should be made to:

- Richard Millman, Program Director (VIGRE), Directorate for Math & Physical Sciences, Division of Mathematical Sciences, 1025 N, telephone: (703) 292-4878, email: rmillman@nsf.gov
- Henry A. Warchall, Program Director, Directorate for Math & Physical Sciences, Division of Mathematical Sciences, 1025 N, telephone: (703) 292-4861, fax: (703) 292-9032, email: hwarchal@nsf.gov
- Roger T. Lewis, Program Director, Directorate for Math & Physical Sciences, Division of Mathematical Sciences, 1025 N, telephone: (703) 292-4872, fax: (703) 292-9032, email: rlewis@nsf.gov
- John Stufken, Program Director, Directorate for Math & Physical Sciences, Division of Mathematical Sciences, 1025 N, telephone: (703) 292-4881, email: jstufken@nsf.gov

For questions related to the use of FastLane, contact:

- None Specified.

IX. OTHER PROGRAMS OF INTEREST

The NSF *Guide to Programs* is a compilation of funding for research and education in science, mathematics, and engineering. The NSF *Guide to Programs* is available electronically at <http://www.nsf.gov/cgi-bin/getpub?gp>. General descriptions of NSF programs, research areas, and eligibility information for proposal submission are provided in each chapter.

Many NSF programs offer announcements or solicitations concerning specific proposal requirements. To obtain additional information about these requirements, contact the appropriate NSF program offices. Any changes in NSF's fiscal year programs occurring after press time for the *Guide to Programs* will be announced in the NSF *E-Bulletin*, which is updated daily on the NSF Website at <http://www.nsf.gov/home/ebulletin>, and in individual program announcements/solicitations. Subscribers can also sign up for NSF's *Custom News Service* (<http://www.nsf.gov/home/cns/start.htm>) to be notified of new funding opportunities that become available.

Related Programs:

The NSF Guide to Programs is a compilation of funding opportunities for research and education in science, mathematics, and engineering. The NSF Guide to Programs is available electronically at <http://www.nsf.gov/pubsys/ods/getpub.cfm?gp/>. General descriptions of NSF programs, research areas, and eligibility information for proposal submission are provided in each chapter.

Many NSF programs offer announcements concerning specific proposal requirements. To obtain additional information about these requirements, contact the appropriate NSF program offices listed in Appendix A of the GPG. Any changes in NSF's fiscal year programs occurring after press time for the Guide to Programs will be announced in the NSF Bulletin, available monthly (except July and August), and in individual program announcements.

The Bulletin is available electronically via the NSF Web site at: <http://www.nsf.gov/home/ebulletin/>. Subscribers can also sign up for NSF's Custom News Service (<http://www.nsf.gov/home/cns/>) to be notified of new funding opportunities that become available.

Specific programs related to VIGRE that might be of interest include the following.

Grant Opportunities for Academic Liaison with Industry (GOALI) ([NSF 98-142](#))

University-Industry Cooperative Research Program in Mathematical Sciences ([NSF 00-121](#))

Integrative Graduate Education and Research Training Program (IGERT) ([NSF 00-78](#))

Research Experiences for Undergraduates (REU) ([NSF 01-121](#))

Elementary, Secondary, and Informal Education: Program Solicitation and Guidelines ([NSF 01-60](#))

Division of Undergraduate Education: Course, Curriculum, and Laboratory Improvement (CCLI) ([NSF 02-043](#))

Mathematical Sciences Postdoctoral Research Fellowship Program ([NSF 01-126](#))

NSF Graduate Fellowship Program ([NSF 01-146](#))

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) funds research and education in most fields of science and engineering. Awardees are wholly responsible for conducting their project activities and preparing the results for publication. Thus, the Foundation does not assume responsibility for such findings or their interpretation.

NSF welcomes proposals from all qualified scientists, engineers and educators. The Foundation strongly encourages women, minorities and persons with disabilities to compete fully in its programs. In accordance with Federal statutes, regulations and NSF policies, no person on grounds of race, color, age, sex, national origin or disability shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving financial assistance from NSF, although some programs may have special requirements that limit eligibility.

Facilitation Awards for Scientists and Engineers with Disabilities (FASSED) provide funding for special assistance or equipment to enable persons with disabilities (investigators and other staff, including student research assistants) to work on NSF-supported projects. See the GPG Chapter 11, Section D.2 for instructions regarding preparation of these types of proposals.

The National Science Foundation promotes and advances scientific progress in the United States by competitively awarding grants and cooperative agreements for research and education in the sciences, mathematics, and engineering.

To get the latest information about program deadlines, to download copies of NSF publications, and to access abstracts of awards, visit the NSF Website at <http://www.nsf.gov>

- **Location:** 4201 Wilson Blvd. Arlington, VA 22230
- **For General Information** (NSF Information Center): (703) 292-5111
- **TDD (for the hearing-impaired):** (703) 292-5090

- Send an e-mail to: pubs@nsf.gov
- or telephone: (301) 947-2722
- **To Locate NSF Employees:** (703) 292-5111

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to applicant institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies needing information as part of the review process or in order to coordinate programs; and to another Federal agency, court or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records," 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records," 63 Federal Register 268 (January 5, 1998). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

An agency may not conduct or sponsor, and a person is not required to respond to an information collection unless it displays a valid OMB control number. The OMB control number for this collection is 3145-0058. Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding this burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to: Suzanne Plimpton, Reports Clearance Officer, Division of Administrative Services, National Science Foundation, Arlington, VA 22230.

OMB control number: 3145-0058.